Purpureine.

When purpurine is dissolved in dilute ammonia, and exposed to the air for about a month in a warm place, ammonia and water being added from time to time as they evaporate, the purpurine disappears, whilst a new colouring matter is formed, which dyes unmordanted silk and wool of a fine rose-colour, but is incapable of dyeing vegetable fabrics mordanted with alumina.

This new substance, which, from its mode of formation and physical properties, is so analogous to orceine, I have called *purpureine*. When pure, it forms fine long needles of a deep crimson colour, insoluble in dilute acids, slightly soluble in pure water, and very soluble in alcohol and in water rendered slightly alkaline. Professor Stokes has examined purpureine optically, and finds the spectrum the same in character as that of purpurine, but different in position, the bands of absorption being severally nearer to the red end.

From the analyses, purpureine seems to yield the formula $C_{66} H_{24} N_2 O_{20}$.

Nitropurpurine.

When purpurine is dissolved in a small quantity of nitric acid, spec. grav. about ·135, and heated to 100° C., it gives off red fumes, and on being allowed to cool, a substance separates in fine scarlet prisms, somewhat like chromate of silver, only of a brighter colour. It is quite insoluble in water, but slightly soluble in spirit; it is, however, soluble in strong nitric acid. When heated, it deflagrates. From this circumstance, and considering its mode of formation, it is evidently a nitro-substitution compound. I have therefore called it nitropurpurine.

When alizarine and munjistine are subjected, in the manner above described for purpurine, to the joint action of ammonia and oxygen, substantive colours are produced, neither of which are crystalline.

Action of Bromine on Alizarine.

When alcoholic solutions of alizarine are mixed with water, and aqueous solution of bromine added, a yellow precipitate is produced; the solution filtered from this, after expelling the spirit by heat, deposits a deep orange-coloured crystalline compound, which, from the analyses of six specimens prepared at different times, I find has the composition

$$C_{60} H_{16} Br_2 O_{18} = C_{20} H_6 O_6,\ 2(C_{20} H_5 BrO_6).$$

Purpurine, when treated with bromine in a similar manner, does not yield a corresponding compound.

II. "On the Magnetic Variations observed at Greenwich." By Professor Wolf of Zurich. Communicated by G. B. Airy, F.R.S., Astronomer Royal. Received December 21, 1863.

(Translation.)

In April 1863 Professor Airy kindly communicated to me the Mean

daily variations of the Declination as given by the Greenwich Observations 1841–1857, and as entered in the subjoined Table under v_1.

Year.	Ratios	Mean absolute variat.	Calculated by (I).		Calculated by (II).		Hourly mean of the Declination.				Max. — Min.	Calculated by (III).		Calculated by (IV).	
	r.	v_1.	v_1.	Diff.	v_1.	Diff.	Maximum.	At	Minimum.	At	v_2.	v_2.	Diff.	v_2.	Diff.
		′	′	′	′	′	° ′	h	° ′	h	′	′	′	′	′
1841	29·7	10·1	11·61	−1·51	11·59	−1·49	23 22·1	2	23 13·4	12	8·7	7·83	+0·87	9·01	−0·31
1842	19·5	13·3	11·04	+2·26	10·97	+2·33	23 20·2	2	23 11·9	12	8·3	7·41	+0·89	8·40	−0·10
1843	8·6	11·6	10·43	+1·17	10·30	+1·30	23 17·6	2	23 9·4	20	8·2	7·01	+1·19	7·78	+0·42
1844	13·0	11·6	10·68	+0·92	10·57	+1·03	23 20·8	2	23 13·0	12	7·8	7·18	+0·62	7·83	−0·03
1845	33·0	12·1	11·80	+0·30	11·79	+0·31	23 2·6	2	22 54·1	20	8·5	7·96	+0·54	8·54	−0·04
1846	47·0	13·6	12·58	+1·02	12·65	+0·95	22 55·8	2	22 47·2	20	8·6	8·50	+0·10	8·96	−0·36
1847	79·4	17·8	14·40	+3·40	14·62	+3·18	22 58·2	2	22 48·4	18	9·8	9·77	+0·03	10·08	−0·28
1848	100·4	15·3	15·57	−0·27	15·90	−0·60	22 59·8	2	22 48·5	20	11·3	10·59	+0·71	10·70	+0·60
1849	95·6	14·3	15·30	−1·00	15·61	−1·31	22 44·8	2	22 34·5	20	10·3	10·40	−0·10	10·29	+0·01
1850	64·5	12·9	13·56	−0·66	13·71	−0·81	22 30·5	2	22 20·5	20	10·0	9·19	+0·81	8·93	+1·07
1851	61·9	11·6	13·42	−1·82	13·56	−1·96	22 23·7	2	22 15·8	21	7·9	9·08	−1·18	8·64	−0·74
1852	52·2	13·0	12·87	+0·13	12·96	+0·04	22 23·4	2	22 15·4	9	8·0	8·71	−0·71	8·12	−0·12
1853	37·7	11·3	12·06	−0·76	12·08	−0·78	22 15·0	2	22 8·0	11	7·0	8·14	−1·14	7·45	−0·45
1854	19·2	11·3	11·03	+0·27	10·95	+0·35	22 5·7	2	21 58·5	11	7·2	7·42	−0·22	6·68	+0·52
1855	6·9	10·6	10·43	+0·26	10·20	+0·40	21 53·3	2	21 46·4	11	6·9	6·94	−0·04	6·14	+0·76
1856	4·2	8·7	10·19	−1·49	10·04	−1·34	21 47·6	2	21 41·8	20	5·8	6·83	−1·03	5·93	−0·13
1857	21·6	9·0	11·16	−2·16	11·10	−2·10	21 39·4	1	21 33·8	10	5·6	7·51	−1·91	6·32	−0·72
		Sum of squares		34·7350	………	35·1531					Sum of squares		12·7773	………	4·1458
1858	50·9		12·80		12·88							8·66		7·03	
1859	96·4		15·35		15·66							10·43		8·13	
1860	98·6		15·47		15·79							10·52		7·97	
1861	77·4		14·28		14·50							9·69		7·19	
1862	59·4		13·28		13·40							8·99		6·55	

I naturally lost no time in proceeding to try whether I could not repre-

sent them from my Sun-spot-ratios r in the same way that I had succeeded in doing with those obtained at numerous other stations (see different Nos. of my "Mittheilungen über die Sonnenflecken"), and I obtained the formula

$$v_1 = 9'{\cdot}95 + 0{\cdot}056.r. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad \text{(I)}$$

The comparison contained in the Table between the observed values and the values computed by formula (I) gave me, however, a strikingly less good accord than I had obtained for Munich, Prague, Christiania, &c.; and this induced me to try how it would be if I formed groups of the years "rich," "medium," and "poor" in sun-spots, and compared for each group the mean variation with the mean ratio. Thus

Years.	Sun-spots.		Mean.	Calculated by (II).	
	Number.	Mean r.	v_1.	v_1.	Diff.
			′	′	′
1841–1842	Medium	24·60	11·70	11·28	+0·42
1843–1844	Poor ...	10·80	11·60	10·44	+1·16
1845–1846	Medium	40·00	12·85	12·22	+0·63
1847–1849	Rich ...	91·80	15·80	15·38	+0·42
1850–1852	Medium	59·53	12·50	13·41	−0·91
1853–1854	Medium	28·45	11·30	11·52	−0·22
1855–1857	Poor ...	10·90	9·43	10·44	−1·01
			Sum of squares		3·9919

And I then obtained the formula

$$v_1 = 9'{\cdot}78 + 0{\cdot}061.r, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad \text{(II)}$$

the comparison of which with the values derived from the observations shows a much better accord, without the individual years being much worse represented than by (I). It follows that the Greenwich observations also give on the whole a march corresponding to that of the sun-spots, but at the same time with materially greater deviations than appear in the continental stations which I have previously treated.

When I communicated to Professor Airy the unexpected result of my calculations, he called my attention to the circumstance that his variations were *absolute* ones, *i. e.* the means of the differences between the daily extremes, while the variations at other stations which I had employed were probably obtained from observations at definite hours; and on my informing him that such was really the case, he gave me in addition the Means of the Declinations which corresponded at Greenwich to the prescribed hours of Göttingen time. It is from these subsequently communicated values that I have derived the maxima and minima and their differences entered in the Table under v_2. The calculation of the quantities in v_2 then led me to make the formula

$$v_1 = 6'{\cdot}67 + 0{\cdot}039.r; \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad \text{(III)}$$

and the comparison in the Table of the values computed by this formula with those derived from the observations does in fact show a much greater accord. I was, however, further led to infer that the constants in the formula, which I had perceived to vary slowly with the lapse of time at other stations, must at Greenwich also have changed materially in the 17 years (1841–1857), and thus I was finally led to construct the formula

$$v_2 = 6{\cdot}66 - 0{\cdot}123(t-1849) + [0{\cdot}038 - 0{\cdot}001(t-1849)].x, \qquad \text{(IV)}$$

which, as the Table shows, suits very well with the observations. For application to longer periods it will still require some further modification, and, in particular, to be augmented by corrections from the term $(t-1849)^2$. In conclusion, I also computed the variations for the years 1858–1862 by all the four formulæ, and have entered them in the Table for future comparison.

January 21, 1864.

Major-General SABINE, President, in the Chair.

The following communications were read :—

I. "A Description of the Pneumogastric and Great Sympathetic Nerves in an Acephalous Fœtus." By ROBERT JAMES LEE, Esq., B.A. Cantab. Communicated by ROBERT LEE, M.D. Received November 20, 1863. With Supplement, received January 20, 1864.

(Abstract.)

The author observes that hitherto no account has been given of the origin and distribution of the par vagum or pneumogastric nerve in any instance of a fœtus born with brain entirely or partially wanting. This reason has been thought sufficient for communicating to the Royal Society the description of a dissection of the pneumogastric and sympathetic nerves in a fœtus born at the full period, in which the cerebellum and medulla oblongata were absent. At the time of birth it cried, moved, and for the space of one hour might be said to live. All the thoracic and abdominal viscera were found properly formed, and the upper and lower extremities properly developed. The eyes, nose, and mouth were present. The head, when regarded as a whole, seemed as though the posterior and superior parts had been entirely removed, thus leaving the spinal cord and base of the skull exposed. Some tough cerebral matter, covered only by a dense membrane, was seen in two small masses exposed in the cranium, not continuous with the spinal cord (which terminated abruptly at the base of the cranium and was entirely exposed at this point), but separated from it by a bony prominence arising from the floor of the cranial cavity.

After the removal of the extremities, the abdomen was opened and the viscera of the abdominal cavity removed. The anterior halves of the ribs